

Introduction

ICT has emerged as a critical component of educational reform and as an essential element of the school curriculum. Our everyday life and the educational system are growing more dependent on information and communications technology (ICT). The Federal Republic of Nigeria's policy on education (FRN, 2013) encourages the integration of ICT into its curriculum for the benefit of students and defines ICT as any equipment used in the acquisition, storage, manipulation, management, control, display, and transmission of information. New technologies, particularly ICT, have had an impact on the way people live, interact, socialize and study as well as the way the teaching and learning activities are being carried out.

The new generation must learn how to utilize technology since it is the best tool for information processing, and this requires access to computers over the school years. Despite the fact that many students like playing games and doing other computer-related activities, some students and even teachers are still afraid to even touch a computer (Tesfamariam, Khatete, and Mugo, 2020; Falebita, 2019). Computers are mostly seen as means of communication and entertainment by the general public, but they could become a powerful weapon for combating the problems associated with teaching and learning when efficiently utilized. As a result, students and teachers will benefit from increased exposure to ICT usage via computer-based instruction (Falebita, 2019; Yapici and Hevedanli, 2012). Individualizing the learning process could be made possible by ICT usage, which allows students to advance at their speed and provide them with relevant alternative learning methods. According to Falebita (2019), students will be more motivated to study when they get rapid feedback and reinforcement, as well as a stimulating and engaging environment.

Biology is the study of living organisms in all their forms, their development, structures, functions, expansion, distribution, and classification, and it has a special place in the high school science curriculum. It's a requirement for a variety of other profitable and demanding careers, such as medicine, nursing, pharmacology, biochemistry, and agriculture, among others (Olayinka, Ayanda & Adeoye, 2020).

The role of biologists within the context of Nigeria's development can be seen in the search for local raw materials for our industries, contribution to forensic science, and involvement in various aspects of scientific research geared towards providing solutions to current problems. According to Olayinka

(2016) Biology education has practical aesthetic and intellectual values. These values can only be achieved through a sound knowledge of Biology. The importance of Biology in national development underlies the need to provide the insufficient number, of men and women who possess the requisite competence in Biology.

Teachers who are enthusiastic about the profession and see it as a noble and respected one are said to have an attitude of interest (Tok, 2011). Many scientists throughout the globe have contributed to the definition of the term "attitude. They all agree that attitudes are the result of a person's values, emotions, and beliefs (Hacieminoglu, 2016). An attitude is a person's "likes or hates" of a certain thing, person, or event (Heng & Karpudewan, 2015). Attitudes, on the other hand, are thought of as learning outcomes that may be developed.

The way a teacher thinks or behaves may either help or hurt an individual's performance when they are doing their A person's actions and results are influenced by everything around them, according to Madukwe, Onwuka, and Nyejirime (2019). It's frequently a combination of emotions, thoughts, and attitudes that influence behavior. A person's attitude determines how effective he or she is in reaching the objectives he or she sets for himself/herself. The way teachers approach their job as a teacher will have a direct impact on how well they do in the classroom. Emotions and sentiments are at the heart of attitude, and great instructors freely communicate them to their students while also showing genuine concern and interest in their well-being (Abudu, & Gbadamosi, 2014). In a regular classroom, a teacher must display an attitude of excellence in his or her instruction. Teachers must adopt a mindset that fosters good changes in students' cognitive, emotional, and psychomotor development. Good character characteristics such as intellect, neatness, and other attributes are expected of a teacher (Fehintola, 2014).

duties and obligations as a teacher (Oluremi, 2013). It's generally remarked that one's attitude may be either positive or negative. Teachers who have a negative attitude may have a detrimental impact on students' achievement, while teachers who have a positive attitude can have a beneficial impact on their performance (Wirth & Perkins, 2013). Students' academic achievement is directly or indirectly influenced by a teacher's attitude. Teachers' attitudes have a significant impact on student enthusiasm in learning, according to Shittu and Oanite (2015). Students' academic success in school may be

strongly influenced by teachers' professional attitudes in the areas of communication, classroom management, and pedagogy.

The academic performance of students may be harmed by teachers' negative attitudes on their duties as educators, while teachers who have a positive attitude toward their jobs will go a long way toward improving students' performance (Abimbola & Abidoye, 2013). Agidi (2014) in Fashina & Akanji, (2016), observed that teachers are effective and dominating factor among the ones contributing to educational improvement. According to the researcher, teacher effectiveness depends mainly on the teacher's attitude and the classroom phenomena.

With ICT gaining global acceptance and its integration in every field of endeavour, a concerted effort must be made to equip teachers for challenges ahead. Lack of skilled teachers with relevant knowledge and competence on the use of ICT determines students' level of success or failure (Fashina and Akanji, 2016). There is substantial evidence that using ICT helps students and teachers learn and teach respectively more efficiently and effectively. Several studies have shown that ICT gives educational possibilities and a classroom setting that is ready for classroom teaching (Aiyebelehin, 2012; Hoshit, 2006; Yusuf, 2000).

Research carried out by Msila (2015) in South Africa, to assess the opinion of teachers on ICT usage in teaching revealed that younger teachers were more open-minded than the older teachers who considered the introduction of ICT discouraging. In the conclusion of the research, it was indicated that the effectiveness of ICT in classrooms relied more on teacher ability as well as favorable attitudes towards ICT. Similarly, Yapici and Hevedanl (2012) revealed that pre-service Biology teachers had a favorable attitude with no difference in gender or class. Also, Tesfamariam, Khatete and Mugo (2020) found biology teachers to have a positive attitude towards the use of ICT through the teachers were not using it for Biology instructions in schools in the southern region of Eritrea.

This study, therefore, sought to investigate biology teachers' attitudes towards the use of information and communication technology in secondary schools in Ekiti State, Nigeria.

ICT can transform the way we live, prepare students for the workforce, enhance educational systems, and transform the way individuals' access and

process information. Some secondary schools in Nigeria are still reluctant to use ICTs for teaching and learning, despite their many benefits. No significant progress has been made in integrating ICT into secondary education. These attempts are hampered by issues such as ineffective government policies and unstable information infrastructure. Specifically, this study sought to investigate biology teachers' attitudes towards the use of information and communication technology in secondary schools in Ekiti State, Nigeria.

Two research questions were posed:

1. What is the attitude of Biology teachers towards the use of ICT for Biology instruction?
2. What are the factors influencing the attitude of teachers toward the adoption of ICT tools in teaching?

One hypothesis was formulated:

H₀: There is no significant gender difference in the attitude of biology teachers towards the adoption of ICT.

Method

The study adopted a descriptive survey research design. Two research questions were posited and one hypothesis was raised for this study. The population for this study comprised all senior secondary school biology teachers (male and female) in Ekiti State. Eight (8) local government areas were randomly selected out of the sixteen local government area in Ekiti States. A purposive sampling technique was used to select five secondary schools from each of the local government areas selected for the study. A total of forty (40) senior secondary schools were selected from each of the selected local government areas. Finally, in choosing biology teachers, a purposive sampling technique was employed to select all the biology teachers from each of the selected schools to make a total of 177 (79 male and 98 female) senior secondary school biology teachers used for the study.

The questionnaire was made of structured (Likert-type). Section A contained demographic characteristics of the respondents, the school, teaching subject, highest academic or professional qualification, age, years of teaching experience, level of computer training, access to the computer and access to the internet. Section B consisted 20 items related to each of the research questions. It is a four-option Likert-type scale requesting respondents to respond to the items related to each of the researcher's questions. The response options were rated as follows; Strongly Agree (SA) = 4, Agree (A) =3,

Disagree(D) =2 and Strongly Disagree (DS) =1. The face, content and construct validity of the instrument was ensured by the researcher supervisor, biology expert and expert in test and measurement that has facial relevance and it is the concern with the subject the instrument claims to measure. The reliability of the instruments was determined through its administration on 20 teachers who were outside the study area and a reliability coefficient of 0.81 was obtained using Cronbach alpha for the analysis of the data gathered at 0.05 level of significance.

Tests for the face validity of the instrument was conducted. Computer science education and test and measurement experts validated the questions and provided revisions and comments on the clarity of items and response alternatives in order to suit the research questions. An additional step in ensuring instrument quality was a thorough review of every item in the survey and confirmation that it was directly related to study goals.

In order to answer the research questions, the data were analyzed using descriptive statistics such as frequency count and percentage, bar charts, mean and standard deviation, and t-test statistics was employed for the test of hypothesis at 0.05 level of significance.

Results:

Demographic distribution of the respondents

Gender of Respondents

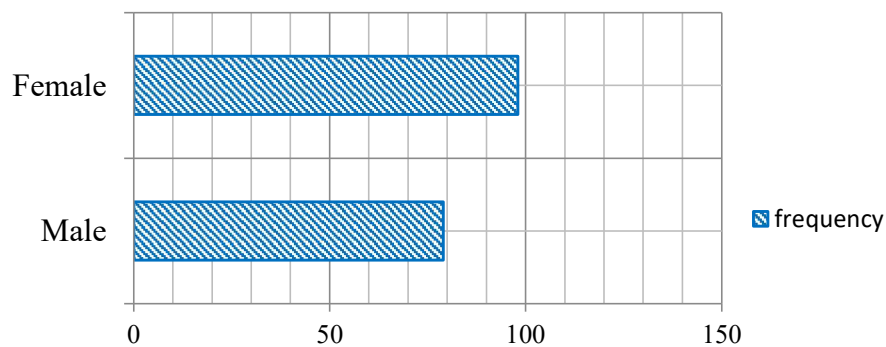


Figure 1: Respondents' Gender

Figure 1 shows the gender of the respondents who are biology teachers. The respondents involved in the study are 98 (55.5%) female and 79 (44.6%) male. This is an indication that both male and female biology teachers constituted the respondents of the study and the majority of the respondents are female.

Respondents' Year of Teaching Experience

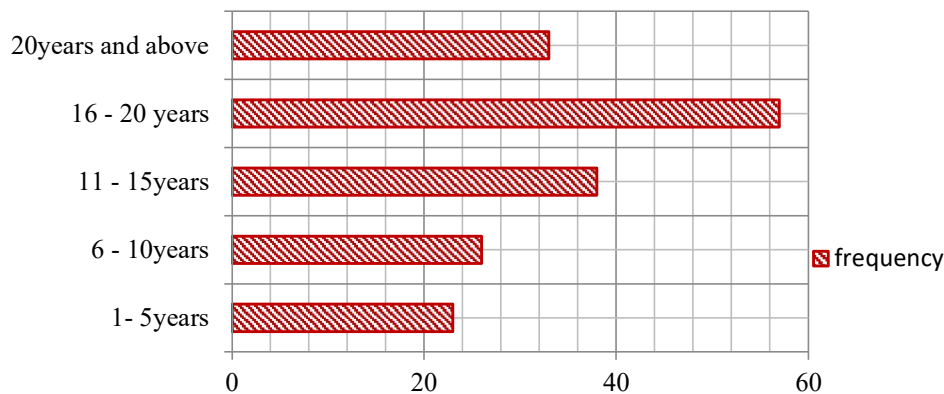


Figure 2: Respondents' Teaching Experience

Figure 2 reveals that 13.0% (23) of the biology teachers who were involved in the study had 1 – 5 years of teaching experience, 14.7% (26) had 6 – 10 years of teaching experience, 21.5% (38) had 11 – 15 years teaching experience, 32.2% (57) had 16 – 20 years teaching experience while 18.6% (33) had 20 years and above teaching experience. This is an indication that all the respondents were experienced biology teachers and the majority of them had over 15 years experience of teaching biology in secondary schools.

Computer Literacy Competency of the Respondents

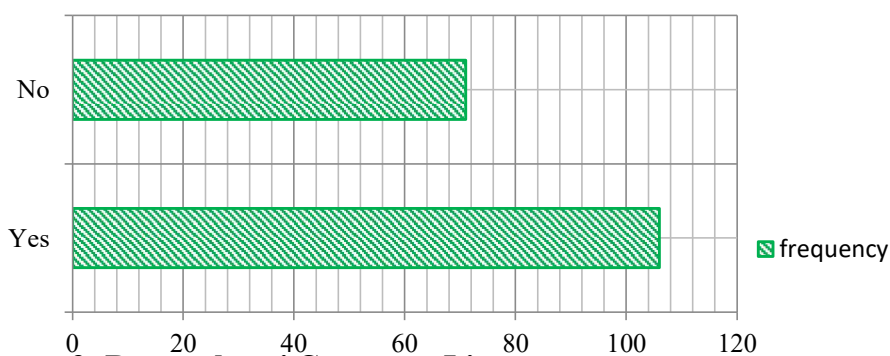


Figure 3: Respondents' Computer Literacy Competence

Figure 3 shows that 59.9% (106) of the biology teachers who were the respondents of the study were computer literate and capable of using computer sets while 40.1% (71) were not computer literate. This is an indication that

most biology teachers were computer literate. Although, a large number of the teachers admitted not being efficient in the use of computer sets.

Table 1: Attitude of Biology Teachers towards the Adoption of ICT for Biology Instruction

SN	Item	N	\bar{x}	S.D	Decision
1	I make use of ICT gadgets in teaching my students	177	1.365	0.771	Disagreed
2	Even without the use of technology, I can provide an effective lesson.	177	2.985	0.943	Agreed
3	It's absurd to force teachers to use computers in the classroom.	177	2.575	1.301	Agreed
4	The use of ICT does not promote effective learning.	177	2.320	0.807	Disagreed
5	Students are distracted by the use of ICT in biology classes.	177	2.635	1.135	Agreed
6	Students' performance in national biology examinations does not considerably improve with the use of ICT in biology instruction.	177	2.965	0.804	Agreed
7	I would not use ICT in the teaching of biology.	177	2.375	1.305	Disagreed
8	Biology classes are not fascinating to students because of the usage of ICT.	177	2.545	0.844	Agreed
9	Using ICT may diminish the teacher-student connection since it diminishes interaction between teachers and students.	177	1.940	1.239	Disagreed
10	Teachers' ability to be innovative is hampered by the use of ICT in the classroom.	177	2.805	0.692	Agreed
11	The use of ICT, in my opinion, does more damage than benefit	177	2.950	0.996	Agreed
12	Students cannot be actively engaged in Biology classes when ICT is in use.	177	2.335	0.822	Disagreed

Source: Responses to biology teachers' questionnaire

Table 1 shows the attitude of biology teachers towards the adoption of ICT for biology instructions. Based on a cut-off mean score of 2.5, five items were disagreed subject to the cut-off mean score while seven items were agreed on. The disagreed statements include items 1, 4, 7, 9 and 12. This is an indication that most of the teachers did not incorporate ICT into biology instruction; they believed that the use of ICT for instruction could promote effective learning; they are willing to use ICT for biology instruction; they do not believe that the use of ICT will break the interaction between the teacher and the students; and they were of the opinion that students could still be actively engaged in biology classes when ICT is in use. Also, the agreed statements include items 2, 3, 5, 6, 8, 10 and 11. This is an indication that most of the teachers were of the opinion that: they can provide effective instruction without the use of ICT; the use of ICT for instruction should not be forced on them; students are being distracted during biology instruction when ICT is in place; the use of ICT for biology instruction does not considerably improve students' performance in national biology examinations; biology lessons cannot be fascinating to students while using ICT; the adoption of ICT for biology instruction would hamper the teachers' ability to be innovative in the classroom; and the use of ICT for biology instructions could cause more damage than the good.

This suggests that biology teachers do not use ICT for biology instruction and thus have a negative attitude towards the adoption of ICT for biology instruction, even when they were aware of the enormous benefit of using it.

Table 2: Factors influencing the Attitude of Biology Teachers towards the Adoption of ICT for Biology Instruction

SN	ITEM	N	\bar{x}	S.D	Decision
13	There are available resources in school that encourages the use of ICT in teaching Biology	177	1.950	1.074	Disagreed
14	I have acquired adequate ICT skills that could make me utilize ICT in teaching biology	177	1.425	0.910	Disagreed
15	Rather than spend time preparing ICT software for biology topics, it is more beneficial for students to be taught via conventional methods.	177	2.840	1.054	Agreed
16	Good internet facilities can be accessed in my school	177	2.145	0.876	Disagreed
17	If all resources are provided, I am willing to adopt ICT for biology instruction	177	2.530	0.838	Agreed
18	There is need for provision of technical support for me to effectively utilize ICT for biology instruction.	177	2.600	1.103	Agreed
19	There is need for special motivation from the school administrator for me to adopt ICT for biology instruction	177	2.515	0.789	Agreed
20	Being a male/female teacher is really affecting my usage of ICT for biology instruction	177	2.300	1.160	Disagreed

Source: Responses to biology teachers' questionnaire

Table 2 indicates the factors possibly responsible for the attitude of biology teachers towards the adoption of ICT for biology instruction. Four items were disagreed subject to the cut-off mean score of 2.5 while four items were also agreed on. Items 13, 14, 16 and 20 were disagreed on while items 15, 17, 18 and 19 were agreed on. This is an indication that the teachers were of the opinion that: the resources that encourage the use of ICT in teaching Biology were not available in schools; they had not acquired adequate ICT skills that

could make them utilize ICT for biology instruction; much time was spent preparing ICT software for biology instruction and it was thus beneficial for students to be taught via conventional methods; good internet facilities could be accessed while in school; if all resources and technical support for effective utilization of ICT during biology instruction; there was need for special motivation from the school administrators for them to adopt ICT for biology instruction; if resources were provided they were willing to adopt ICT for biology instruction; there was need for provision of special motivation; and the teachers' gender did not influence their usage of ICT for biology instruction.

This suggests that availability of ICT resources in schools, ICT skill acquisition/training, time constraint, availability of technical supports, and motivation were all factors that contributed to the attitude of teachers towards the adoption of ICT for biology instruction.

Table 3: t-test comparison of the male and female biology teachers' attitude towards the adoption of ICT for biology instructions

Gender	N	Mean	Std. Dev.	Df	t-cal	t-tab	p
Male	79	2.455	0.447	175	0.537	1.656	0.592
Female	98	2.417	0.492				

Table 3 shows the t-test analysis of the male and female biology teachers' attitudes towards the adoption of ICT for biology instructions. The male teachers' attitudinal mean score and standard deviation are 2.455 and 0.447 respectively while those of their female counterparts are also 2.417 and 0.492 respectively. The table revealed that $t\text{-cal} = 0.537$ while the $t\text{-tab}$ is 1.656; $p > 0.05$ at 0.05 significant level. The hypothesis is therefore not rejected. This shows that there was no significant gender difference in the attitude of biology teachers towards the adoption of ICT.

Discussion

The study examined the attitude of biology teachers to the adoption of ICT for biology instruction in secondary schools. It was found from that biology teachers did not use ICT for biology instruction and thus had a negative attitude towards the adoption of ICT for biology instruction, even when they were aware of the enormous benefits of using it. This finding contradicts the findings of Msila (2015), Yapici and Hevedanli (2012) and Tesfamariam, Khatete and Mugo (2020) who all at different times and locations found that

teachers had a positive attitude towards that adoption of ICT for teaching and learning in secondary schools. This finding also supports the finding of Tesfamariam, Khatete and Mugo (2020) who revealed that biology teachers did not adopt ICT for biology instruction in schools. The attitude shown by the teachers towards the adoption of ICT for biology instruction could be due to the non-usage of ICT for instructions in secondary schools.

It was also found from the study that there were certain factors influencing the attitude of teachers towards the adoption of ICT for biology instructions in secondary schools; these factors included the availability of ICT resources in schools, ICT skill acquisition/training, time constraint, availability of technical supports, and motivation. Teachers' gender did not necessarily contribute to or determine their attitude towards the adoption of ICT for biology instruction. This finding is in line with the finding of Yapici and Hevedanli (2012) who revealed that the attitude of teachers towards the use of ICT in school did not differ by their gender. This could be an indication that when ICT resources and technical supports were available to teachers in schools, they would be encouraged to go for training and acquire the needed skill for its utilization for classroom instruction.

The study also revealed no significant gender difference in the attitude of biology teachers towards the adoption of ICT. This finding is in line with the finding of Yapici and Hevedanli (2012) who revealed that the attitude of teachers towards the use of ICT in school did not differ by their gender. This is an indication that gender is never a barrier to the use of ICT for classroom instruction; both male and female teachers can utilize it once they are skillfully equipped and resources made available to them.

Conclusion

It is concluded from this study that most of the biology teachers in secondary schools are not using ICT for biology instruction. They were found to have a negative attitude towards the adoption of ICT for classroom instructions. It was also concluded that factors such as availability of ICT resources in schools, ICT skill acquisition/training, time constraint, availability of technical supports, and motivation were found to influence teachers' attitudes towards the adoption ICT for classroom instructions in secondary schools.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Teachers (both male and female) should get professional training (both in-service and pre-service) to prepare them for ICT integrated teaching and learning.
2. Teachers' access to and proficiency with ICT must be promoted by government policy.
3. The government should make it a priority to provide ICT resources to secondary schools for wider use.

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